Effect of incentive policy on performance and international competitiveness of fruits, vegetables, and olive oil in Morocco: the case of greenhouse tomatoes, Clementine mandarins, and Maroc-Late oranges

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Summary

This article presents a brief review of agriculture situation in Morocco and deals with evaluating the effects of Morocco's incentive policy on performance and international competitiveness of four agricultural produce. These products are: green house tomatoes, two citrus fruits: the large orange variety Maroc- Late and the small fruit Clementine, and olive oil. Data of the respective agricultural chains of the four products were collected in two major producing areas of the products, and were used to calculate the Nominal Protection Coefficients (NPC) and the Effective Protection Coefficients (EPC) to evaluate the effects of the local incentive policy, and to calculate the Domestic Resource Cost (DRC) ratios as indicators of international competitiveness of the products.

The four NPC ratios, which all were less than one, indicate that the four products are relatively taxed. In addition, the EPC's show that along with the direct taxes on these products, indirect taxes on their inputs are further penalizing these products.

All the DRC ratios for the four products were also less than one, indicating a comparative advantage and an efficient allocation of domestic resources. Green house tomatoes had the smallest DRC, 0.36. Those of the two citrus products were a little higher; 0.41 for the Clementine and 0.50 for Maroc- Late.

Olive oil had the highest, 0.93, DRC. The low yield per hectare is the main contributor to this relatively modest performance. However, there is a considerable potential for this product if its productivity is improved and the processing industry along with the marketing channels are modernized.

Reforms therefore need to be implemented to correct the distortions introduced by the current incentive system which is biased against the export oriented products and is favorable to import substitute products. Such reforms will have to ensure better allocations of domestic resources according to the comparative advantage of the country and to deal with the challenges

facing the agricultural sector within the trade agreements signed by Morocco with its trade partners.

I. Introduction

Morocco undertook a structural adjustment program from 1985 to 1993. The program has resulted in diminishing the government role in the agricultural sector, led to liberalization of domestic markets and trade, and prompted a review of the incentive system which gradually shifted from input to investment subsidies.

As a member of the World Trade Organization, Morocco replaced all quantitative protection measures with *ad valorem* tariff after the ratification of the Marrakech GATT agreement, and reduced tariffs by 24% over the last ten years. The country has also confirmed its commitment to a liberal market and an open economy through the signature of a set of trade agreements with the USA, Jordan, Tunisia, the United Arab Emirates, Turkey, the Arab league members, and an association agreement with the EU. Negotiations for free trade agreements with other countries are underway. While these agreements present new opportunities for developing Moroccan agricultural exports, they raise serious challenges for the competitiveness of its export oriented as well as the import substitute agricultural products.

This study aims, on the one hand, at estimating the effect of the Moroccan incentive policy for four agricultural products: green house tomatoes, tow citrus fruits: the Maroc-Late orange variety and the Clementine small citrus fruit, and olive oil; on the other hand, it aims at evaluating their international price competitiveness. The study follows an economic chain analysis approach with respect to reference prices, based on three indicators: Nominal Protection Coefficient (NPC), Effective Protection Coefficient and Domestic resource cost (DRC) as a measure of comparative advantage. The protection coefficients compare domestic prices to world market prices considered as opportunity costs, and indicate the implicit weigh of taxes and subsidies in the structure of domestic prices.

II. Overview of the Moroccan agricultural sector and the importance of fruits and vegetables

Agriculture is a key sector of the Moroccan economy, playing crucial social and economic roles. Agriculture’s contribution to the country’s GDP varied from 14% to 20% in the last 10 years depending on rainfall. Its share comes second after that of the ‘commerce’ sector and is as important as that of the industrial sector. It provides employment to 40% of the national labour force and to 80% of the rural labour force. It also contributes considerably to the country’s food security through self-sufficiency ratios reaching in good harvest years more than 100% for fruits and vegetables, about 98% for meat, 87% for milk, 72% for cereals, 52% for sugar and 25% for edible oils. Agricultural exports represented on average 12% of the overall national export over the last 5 years (MADRPM, 2002; Jacquet et al., 2004). The overall economy growth is highly correlated with the agricultural GDP.

The agricultural sector performance is highly dependent on climatic conditions, since 88% of the arable land is made up of rainfed agriculture. Furthermore, over two-thirds of Morocco's total area can be classified as arid and semiarid with low and variable rainfall and frequent droughts. In at least the past two decades, rainfall has been erratic, hence leading to huge fluctuations in agricultural production, income, and related economic activities of commerce, food processing and services. Cereal production, which is the major driver of agricultural GDP, varied from 10 million tons in 1996 and 1.8 million tons in 2000. Consequently, the agricultural GDP growth varied from –17% and +28%, affecting dramatically the growth of the national economy (MADRPM, 2001; MADRPM, 2002; FAO, 2004). Drought is no longer considered as an 'exceptional' phenomenon but rather a 'structural' one.

Data (MADRPM, 2001 and 2002; FAO, 2004) indicate that cereals are the major crops grown in Morocco, both in terms of acreage and production. These crops occupy an average of 5.3 millions hectares representing about 61% of the total arable land.

The data also indicate that total fruit plantation area amounts to around 980,000 Ha constituting approximately 11% of Morocco's total arable land. Citrus fruit acreage amounted to 76,000 Ha in 2002, of which the productive groves were on 68,200 Ha. This acreage has been almost stagnant over the last 30 years. The implementation of a national action plan, providing subsidies for investment and setting an expansion objective of 2000 Ha/year for the period 1998-2005, did not have the desired stimulating effect. Citrus yields are low compared to other competing Mediterranean countries and fluctuate significantly, depending on varieties, technical patterns, regions and climatic conditions. Average yield for all varieties combined is 19 tons/Ha, which is low compared to other major producing countries, such as the USA (40 tons/ha in Florida and 35 tons in California, USA). Furthermore, over the last five years, yield has been on a downward trend, decreasing by 25% to 30%. Citrus production is subject to several structural constraints mainly: orchards ageing, water shortages in some regions causing a subsequent rise in water pumping costs, a lack of certified quality seedlings adapted to local conditions of each producing region and unfavourable climatic conditions. Citrus production is irregular with an average of 1,282,940 tons during the last five crop years. Close to 78% of production is made of three varieties: Clementine, Navel and "Maroc-Late".

Olive tree is the major fruit species in Morocco and covers 560,000 Ha, representing 57% of fruit plantation acreage. Production averaged 550,000 tons of olives over the last five years. The major part of this production, 65%, is affected to processing in 160,000 traditional units and 260 industrial units; and 25% is destined to canning industry in 50 units. Olive acreage tripled during the last three decades. Expansion was seriously boosted up since the government launched an incentive program of subsidizing olive seedlings for new plantations. Yields average 1 ton/Ha at the national level and 1.8 tons/Ha in irrigated areas. Such figures are rather low compared to other Mediterranean countries. In addition, yields vary considerably from one year to another due to the production alternation phenomenon [1], to inappropriate technical patterns of production and erratic climatic conditions (Lahlou, 2000; FAO, 2004).

Olive oil production is around 50,000 tons annually, supplying about 81% of the oil domestic consumption, and 12% of the total domestic demand for edible oils. However, more than 85% of this olive oil is of "petrol oil" quality that does not meet the quality standards recommended by the International Olive Oil Council. According to some estimates, olive oil production with less than 1.5% acidity (virgin, extra-virgin and fine) does not exceed 3,000 tons. This situation stems from timeworn processing units and the lack of professional organisations that can promote the integration of the supply chains associated with olive production activities (Lahlou, 2000; FAO, 2004).

The vegetable sector occupied an average of 242,000 Ha over the last five years. Potatoes, tomatoes and onion are the main vegetables produced, with a respective acreage of 62,000 Ha, 31,000 Ha and 12,500 Ha. Production averaged 5 million tons, of which 75% was for season vegetables, 20% for early vegetables, and 5% for processing-oriented vegetables (FAOSTAT, 2005; MADRPM, 2001 and 2002a).

Early vegetables' total acreage amounted to 24,500 for the crop year 2001-02 (MADRPM, 2002b), showing a 17% increase with respect to the 1996-2000 average acreage, and by 2% with respect to the previous crop year 2000-2001. Total acreage was stable in spite of annual fluctuations till 1998, and then it started growing at a pace of 5.8 % per year for the four years that followed. While early vegetables' acreage increased by 17% from 1990 to 2002, production doubled during the same period. This performance stems from a substantial improvement in productivity linked to the introduction of new varieties, to the adoption of better production techniques (micro-irrigation, more rational ways to combat diseases …etc.) and to the expansion of the greenhouses (MADRPM, 2002b).

Tomatoes and potatoes are the major early vegetables crops. In 2001-2002, tomato acreage was around 5,900 Ha and represented 24% of early vegetables' acreage. However, an examination of acreage figures since 1990 indicated a stable pattern gravitating around an average of 5,500 Ha. During the same period, tomato production increased considerably, from an average of 355,000 tons during the period 1990-1995 to 524.000 tons in 1996-2000 (+48% increase). During the crop year 2001-02, it reached 565,000 tons, a 28% increase relative to the year before (446,000 tons). This production represents 51% of the total production of early vegetables (MADRPM, 2002b).

[1] The production alternation phenomenon is a biologic phenomenon that characterises olive trees and that results in an up and down trend of yields: a good yield in a given year is automatically followed by a low yield the year after.

The livestock production sector plays important social and economic roles. Two farms out of three (around 1 million farm household) in Morocco are involved in this animal husbandry and 18% of rural population relies exclusively on livestock as a source of income. This subsector share in agricultural GDP varied from 25% to 35% depending on rainfall and feed resources. It significantly contributes to food security in meat, milk and its by-products, and eggs, with respective self sufficiency ratios of 98%, 88% and 100% (Bellekhal, 2004).

The share of food processing sector in Morocco's GDP is 5 %. The subsector provides employment to 90,000 persons, and satisfies 70% to 100% of the country's needs for processed food products. Its exports represent 20% of total exports of manufactured goods (World Bank, 1993; FAOSTAT, 2005).

State support to agricultural sector

Due to its crucial economic and social roles, the Moroccan agricultural sector has always benefited from government support in direct as well as in indirect ways. Three tools are used within the framework of price policy: subsidies, tax exoneration and border protection for basic products, such as cereals, sugar, meat and milk.

Subsidies to inputs, which were the main tool of agricultural incentive policy during the 1970s, were progressively reduced since the late 1980s, and later on completely removed for most inputs such as fertilizers, chemicals and animal inputs, following the implementation of the structural adjustment program in 1985. Subsidies to certified cereal seeds' multiplication are still systematically provided given the strategic importance of this activity, while subsidies to their use are occasionally provided after a dry season to alleviate drought effects on farmers and assist them to start the new season (Akesbi, 2003).

The increase of water tariffs since the late 1997 in large scale perimeters has significantly reduced the level of subsidies to this input. However, irrigation by pumping ground water is taxed through the heavy taxes on diesel fuel (Ait Kadi, 2002).

The elimination of input subsidies expresses actually a shift in incentive policy from subsidizing inputs toward encouraging investment in modern techniques of production through the Fund for Agricultural Development (FAD). Incentives subsidies through this FAD are the most important forms of support to the agricultural sector (Akesbi, 2003). Most of these subsidies go to encourage modern irrigation techniques (30%) and some farm equipments (25 to 40%). Imported inputs and agricultural equipments are subject to a minimum tariff of 2.5% and are exempt from the Value Added Tax.Diesel fuel is exempt of custom duties, but is subject to two taxes: a Domestic Tax of consumption [2] of 242.5 MAD/HL and 7% value added tax. The structure of its

[2] Taxe Intérieur de Consommation.

retail price reveals that 39% of its retail price is made of taxes indicating that the fuel is considerably taxed.

The agricultural sector will be exempt of income taxes till 2010. However, farmers are subject to substantial indirect taxes mainly the domestic tax of consumption on diesel, the value added tax on services downstream the chain, such as transport and packaging, in addition to local taxes on marketing. According to some studies conducted by DPAE (2004)[3], the global fiscal pressure on the agricultural sector is estimated to 4 billion MAD in 1998, which represents 9% of the Agricultural GDP (Jacquet et al., 2004).

State support to the fruit and vegetable sector is therefore low. Tomatoes' support is essentially in the form of subsidies to farm equipments (mainly tractors) and investment in some irrigation equipments, through the FAD. Citrus benefit from subsidies for farm machinery (tractors) and irrigation equipments, plus a lump sum subsidy for plantation of 7800 MAD per hectare planted. Support to oil production is mainly through seedlings subsidies. Farmers have to choose between an 80% subsidy to seedlings or a lump sum subsidy for new plantations of 1800 MAD per hectare planted in rainfed areas and of 2600 MAD per hectare in irrigated areas. These subsidies do not significantly impact farm incomes.

III. Methodology

The economic analysis of fruit and vegetable chains requires that all domestic prices be compared to those prevailing in world market. Such comparison is possible only if goods are tradable or can be converted into equivalent 'tradable goods'. For tradable goods, economic prices were calculated by eliminating, from domestic financial prices, all distortions introduced by public policy instruments (taxes, subsidies, exchange rate setting, and interest rate). For non tradable goods, their financial domestic prices were decomposed into tradable and non tradable inputs: the tradable inputs' economic price was derived from the world market prices, while the economic price of non tradable inputs was considered their opportunity cost.

World market prices were considered to be opportunity costs and were converted into a national currency using an appropriate exchange rate and adjusted to take into account domestic transport costs and marketing margins. The Exchange rate should reflect the opportunity cost of a foreign currency unit for the national economy. The Border price obtained was the cost incurred by the economy to produce the product under consideration.

In order to eliminate possible distortions stemming from exchange policy, nominal exchange rate (NER) was adjusted using real effective exchange rate index. This index based on Purchasing Power Parity results in a real effective exchange rate that represent an opportunity cost of foreign currency unit.

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[3] Direction de la Programmation et des Affaires Economiques (DPAE) ; Ministère de l'Agriculture, du Développement Rural : Note sur la fiscalité agricole au Maroc. 2004.

FOB (Free On Board) and CIF (Cost, Insurance and Freight) prices were used as reference prices since they represent what a given product would generate if it is exported or would cost if it is imported. The resulting border price is the world price converted into the national currency. Social prices for outputs and tradable inputs were taken as border prices adjusted to the farm gate.

Production is not wholly exported. Only 50% of tomatoes, 57% of Clementine, and 60% of Maroc- Late is exported. The remaining part is considered as a by product of a lesser quality and therefore not tradable. Domestic prices for these non exported productions were collected through surveys with farmers. In the case of virgin olive oil, all production was considered as tradable.

Non exported production was evaluated using domestic prices and decomposed into tradable and non tradable inputs based on the structure of cost of production, and then subtracted successively from total tradable and non tradable costs.

Social costs of non tradable inputs should be their marginal productivity in the best alternative production use. Since marginal productivity estimates are not available, social costs can be considered equal to the market prices, except for unskilled labor that, under some protection measures benefit from wages higher than its alternative marginal productivity.

Unskilled labor was considered to have an alternative use of traditional agricultural activities or temporary jobs. Social cost for unskilled labor was taken as the market wage times a coefficient of 0.84[4]. Social cost for skilled labor is equal to its market wage.

Since the State does not intervene in land market, this latter can be considered as a competitive one. Land social price was therefore considered to be its rental market value.

In the region of Souss southwest of Morocco, irrigation is mainly made through private pumping of ground water. Social cost of irrigation water is made of energy expenses (diesel) and irrigation equipment depreciation.

Data used for tomatoes and citrus produce were from the survey of Attioui (2000) in the Souss area; the main tomatoes and citrus exporting region southwest of Morocco. Data for olive oil were from the survey of Lahlou (2000) in the Saïs region at the foots of the medium Atlas Mountains; one of the main olive producing regions of the country[5]. To calculate economic prices for tradable goods, FOB prices were calculated based on export data from of the National Trade Office statistics[6].

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[4] Ministère de l'Agriculture et de la Mise en Valeur Agricole/Direction de la Programmation et des Affaires Economiques, 'La politique des prix et des incitations dans le secteur agricole'. 1986.

[5] Data source: Attioui R., 2000 for citrus and tomatoes; Lahlou O., 2000 for olive oil.

[6] Office des Changes, 2002.

Nominal Protection Coefficient estimations were based only on goods' prices while the Effective Protection Coefficient that measure implicit taxes and subsidies were estimated by taking into consideration distortions in inputs' prices. These protection coefficients were calculated as follow:

Nominal Protection Coefficient (NPC) = P_d/P_b
Effective Protection Coefficient (EPC) = $VA(P_d)/VA(P_b)$

Where: P_d = Domestic price
P_b = border price
$VA(P_d)$ = Value added at domestic price
$VA(P_b)$ = Value added at border price

Domestic Resource Cost (DRC) ratio estimations were obtained by dividing the cost of domestic factors used to produce the commodity by the value added the commodity generates at social prices.

IV. Results and discussion

Nominal and effective Protection

A NPC ratio greater than one means that, due to the State interventions, producers are receiving a price higher than it would be otherwise, meaning a positive protection. In the opposite case, we have a negative protection. A NPC equal to one indicates a neutral structure of protection.

The same interpretation holds for the EPC. An EPC ratio greater than one indicates that producers have incentives to produce more since their inputs generate a value added higher than what it would have been without the State intervention. In the opposite case, producers are taxed and have less incentive to produce. When EPC is equal to one, economic policy is neutral.

As shown in the table 1, all nominal protection coefficients are less than one, meaning that, in spite of all reforms undertaken since the implementation of the structural adjustment program to promote exports, the implemented policy is still biased against export oriented products, which are subject to an implicit taxation.

Table 1: Nominal and effective protection coefficients for Greenhouse tomatoes, Clementine and Maroc-Late citrus fruits, and for olive oil in Morocco.

	Greenhouse Tomatoes	Citrus		Olive oil
		Clementine	Maroc-Late	
Nominal Protection Coefficient	0,93	0,95	0,93	0,95
Effective Protection Coefficient	0,91	0,94	0,91	0,94

The distortions are mainly due to taxes imposed downstream the chain on transport and packaging. In addition to high taxes on energy, and a particularly high cost of transport in Morocco, farmers cannot recuperate incurred value added taxes because of their fiscal status (exempted from income taxes and is therefore not fiscal producer).

The Effective Protection Coefficients show that export oriented products are subject to a negative net protection. In addition to the implicit taxation of products, distortions in the inputs' markets also contribute to this negative net protection. Most of these export oriented products are using inputs and services that are heavily taxed, or whose markets are distorted.

International competitiveness

Domestic Resource Cost (DRC) ratio compares a good's real opportunity cost of production with its aggregated value at international prices. When DRC is smaller than one, the country has a comparative advantage in producing the commodity in question; otherwise the opposite is true. The calculated DRC's are presented in the table 2. All the four products have DRC ratios less than one, indicating a comparative advantage and an efficient allocation of domestic resources. Greenhouse Tomatoes had the lowest DRC (0.36), which is in accordance with the finding of other studies (Attioui R., 2000). The same holds for citrus products, although the DRC's are a bit higher (0.41 for Clementine and 0.50 for Maroc- Late).

Table 1: Domestic resource cost ratios for Greenhouse tomatoes, Clementine and Maroc- Late citrus fruits, and for olive oil in Morocco.

	Greenhouse	Citrus		Olive
	Tomatoes	Clementine	Maroc-Late	Oil
Yield, tons/Ha	150	30	42	0.27
- Exports, tons/ha	75	17	25	0.27
- local market Sales, tons/ha	75	13	17	-
Adjusted border price, MAD/ton	2 302	3 995	1 673	19 423
Social cost of non tradable inputs (MAD)	42 896	25 143	18 782	4 094
Social cost of tradable inputs	51 888	6 581	4 197	862
Social value added (MAD)	120 725	61 341	37 634	4 382
DRC	0.36	0.41	0.50	0.93

Olive oil has the highest DRC (0.93). In spite of this modest performance, a considerable potential still exists if productivity is improved and the processing industry along with the marketing channels are modernized.

V. Concluding remarks

The agricultural sector plays an important economic and social role in Morocco. However, the volatility of its performance is largely due to erratic rainfall variations; recurrent extreme drought conditions in the last two decades have negatively influenced the country's GDP and its growth. In addition, the high weight of cereals in agricultural production, which constitute the main import substitute products, and a consequence of a favorable incentive system, has added to the volatility of Agricultural GDP growth.

The Nominal protection coefficients of greenhouse tomatoes, citrus fruits, and olive oil show that, not only these products do not benefit of any incentive, but are taxed through an overvaluation of the country's currency, the dirham, and through the taxes on activities downstream the chains, such as transport and packaging.

Effective protection coefficients of the four products are globally less than nominal effective protection coefficients, which mean that beside an implicit taxation of these products, they are subject to indirect taxation through inputs.

As for the competitiveness, these products are internationally competitive and show an efficient allocation of domestic resources. The Domestic resource cost ratio varies from 0.36 for tomatoes under green hose to 0.93 for olive oil.

The Moroccan agricultural sector is characterised with the co-existence of a stagnating import substitute sub-sector and a dynamic export oriented one. Both sub-sectors need deep reforms in the light of a changing environment of globalisation and the expansion trade agreements.

To take full advantage of the opportunities offered by such agreements, Morocco has to work on improving the competitiveness of its export oriented products. Market access advantages granted to its products in these new markets will likely be provided to other competing countries. An increase in agricultural exports would have to compensate the losses inherent to the decrease of the protection for import substitute products. The improvement of the competitiveness of export oriented products must also include an increase in their profitability in the domestic market which would constitute an incentive to a better domestic resources' allocation toward these commodities.

If cereals areas are successfully converted to more suitable crops in areas where they do not have a comparative advantage, the whole economy will benefit in many ways. Less protection allotment to cereals and import substitute products will ensure better allocation of resources, which in turn will benefit the export oriented products. Furthermore, the growth rate of the agricultural sector and therefore of the whole economy will be less erratic, reducing the vulnerability of national economy to climatic conditions.

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